

CLAIMS:

1. A high frequency module for mounting on a motherboard, comprising: a substrate, a semiconductor chip fixed on the substrate, and a cap provided above the semiconductor chip, the cap having a flat portion to which heat generated by the semiconductor chip is transferred and extended portions led out from opposite edges of the flat portion, the extended portions of the cap being in contact with side surfaces of the substrate.
- 10 2. The high frequency module as claimed in claim 1, wherein the extended portions are connected to electrodes formed on the motherboard.
- 15 3. The high frequency module as claimed in claim 1, further comprises a roof plate provided between the semiconductor chip and the flat portion of the cap.
4. The high frequency module as claimed in claim 3, wherein the roof plate is thicker than the flat portion of the cap.
- 20 5. The high frequency module as claimed in claim 4, wherein the roof plate contains aluminum.
6. The high frequency module as claimed in claim 1, wherein the semiconductor chip is mounted on the substrate in a flip-chip manner.
- 25 7. The high frequency module as claimed in claim 1, further comprises a non reciprocal circuit element mounted on the substrate, a upper surface

of the non reciprocal circuit element being in contact with the flat portion of the cap.

8. The high frequency module as claimed in claim 7, wherein a side 5 surface of the non reciprocal circuit element is in contact with the extended portion of the cap.

9. A high frequency module for mounting on a motherboard, comprising: a substrate, a semiconductor chip fixed on the substrate, a 10 heat sink having a projecting portion in contact with the semiconductor chip, and means for conducting heat transferred to the heat sink to the substrate.

10. The high frequency module as claimed in claim 9, wherein said 15 projecting portion of the heat sink is formed from one end to the other end of the heat sink.

11. The high frequency module as claimed in claim 10, wherein the heat sink is fabricated by extruding aluminum metal.

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12. The high frequency module as claimed in claim 9, wherein the heat conducting means is a cap having a flat portion covering the heat sink and extended portions led out from opposite edges of the flat portion.

25 13. The high frequency module as claimed in claim 12, wherein the extended portion of the cap is in contact with a first side surface of the substrate.

14. The high frequency module as claimed in claim 12, wherein the extended portions of the cap are connected to electrodes formed on the motherboard.

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15. The high frequency module as claimed in claim 9, further comprises an electronic component provided in a space formed between the heat sink and the substrate.

10 16. The high frequency module as claimed in claim 15, wherein the electronic component is thicker than the semiconductor chip.

15 17. The high frequency module as claimed in claim 13, wherein an upper surface of the non reciprocal circuit element is in contact with the flat portion of the cap.

18. The high frequency module as claimed in claim 17, wherein a first side surface of the non reciprocal circuit element is in contact with a second side surface of the substrate opposite to the first side surface
20 thereof.

19. The high frequency module as claimed in claim 18, wherein the second side surface of the substrate and the first side surface of the non reciprocal circuit element have substantially the same length.

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20. The high frequency module as claimed in claim 18, wherein a second side surface of the non reciprocal circuit element opposite to the first side

surface thereof is in contact with the extended portion of the cap.

21. The high frequency module as claimed in claim 12, wherein the cap has bent portions led out from other opposite edges of the flat portion.

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22. The high frequency module as claimed in claim 21, wherein the bent portion are led out from the flat portion by a shorter distance than the extended portions are led out therefrom.

10 23. The high frequency module as claimed in claim 22, wherein the bent portions extend to points short of side surfaces of the substrate to leave openings between the ends thereof and the substrate.

24. A high frequency module, comprising:

15 a high frequency amplifier portion including a substrate having first and second side surfaces, a semiconductor chip mounted on the substrate, and a heat sink provided above the semiconductor chip;

a non reciprocal circuit element having first and second side surfaces; and

20 a cap having a flat portion, a first extended portion, and a second extended portion,

the high frequency amplifier portion being fixed to the non reciprocal circuit element such that the first side surface of the substrate is contact with the first side surface of the non reciprocal circuit element;

25 the cap being fixed to the high frequency amplifier portion and the non reciprocal circuit element such that the flat portion of the cap is in contact with at least the heat sink of the high frequency amplifier portion,

that the first extended portion of the cap is contact with the second side surface of the substrate, and that that the second extended portion of the cap is contact with the second side surface of the non reciprocal circuit element.

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25. The high frequency module as claimed in claim 24, wherein the first side surface of the substrate and the first side surface of the non reciprocal circuit element have substantially the same length.

10 26. The high frequency module as claimed in claim 25, wherein the first side surface of the non reciprocal circuit element is longer than a distance between the first side surface and the second side surface of the non reciprocal circuit element.

15 27. The high frequency module as claimed in claim 24, wherein the first extended portion of the cap is electrically connected to a motherboard on which the high frequency module is mounted.

20 28. The high frequency module as claimed in claim 24, wherein the non reciprocal circuit element further has an upper surface, the flat portion of the cap being in contact with the upper surface of the non reciprocal circuit element.